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ABSTRACT

The United States Training and Employment Service General Aptitude Test Battery (GATB), first published in 1947, has been included in a continuing program of research to validate the tests against success in many different occupations. The GATB consists of 12 tests which measure nine aptitudes: General Learning Ability; Verbal Aptitude; Numerical Aptitude; Spatial Aptitude; Form Perception; Clerical Perception; Motor Coordination; Finger Dexterity; and Manual Dexterity. The aptitude scores are standard scores with 100 as the average for the general working population, and a standard deviation of 20. Occupational norms are established in terms of minimum qualifying scores for each of the significant aptitude measures which, when combined, predict job performance. Cutting scores are set only for those aptitudes which aid in predicting the performance of the job duties of the experimental sample. The GATB norms described are appropriate only for jobs with content similar to that shown in the job description presented in this report. A description of the validation sample and a personnel evaluation form are also included. (AG)

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June 1970

U.S. Training and
Employment Service
Technical Report
S-140 R

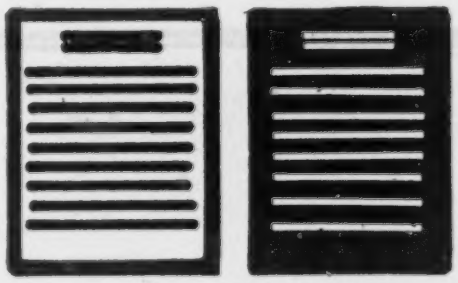
Development of USTES

APTITUDE TEST BATTERY FOR

STRIPPER

(print.& pub.)
971.381

U S DEPARTMENT OF LABOR
Manpower Administration



TM 001 522

Technical Report on Development of USTES Aptitude Test Battery

For . . . .

Stripper (print. & pub.) 971.381

S-140R

(Developed in Cooperation with the
Wisconsin State Employment Service)

U.S. Department of Labor
Manpower Administration

June 1970

FOREWORD

The United States Training and Employment Service General Aptitude Test Battery (GATB) was first published in 1947. Since that time the GATB has been included in a continuing program of research to validate the tests against success in many different occupations. Because of its extensive research base the GATB has come to be recognized as the best validated multiple aptitude test battery in existence for use in vocational guidance.

The GATB consists of 12 tests which measure 9 aptitudes: General Learning Ability, Verbal Aptitude, Numerical Aptitude, Spatial Aptitude, Form Perception, Clerical Perception, Motor Coordination, Finger Dexterity, and Manual Dexterity. The aptitude scores are standard scores with 100 as the average for the general working population, with a standard deviation of 20.

Occupational norms are established in terms of minimum qualifying scores for each of the significant aptitude measures which, in combination predict job performance. For any given occupation, cutting scores are set only for those aptitudes which contribute to the prediction of performance of the job duties of the experimental sample. It is important to recognize that another job might have the same job title but the job content might not be similar. The GATB norms described in this report are appropriate for use only for jobs with content similar to that shown in the job description included in this report.

GATB Study # 2213

Development of USTES Aptitude Test Battery

For

Stripper (print. & pub.) 971.381-018

S-140R

This report describes research undertaken for the purpose of developing General Aptitude Test Battery (GATB) norms for the occupation of Stripper (print. & pub.) 971.381-018. The following norms were established:

GATB Aptitudes	Minimum Acceptable GATB Scores
N-Numerical Aptitude	85
S-Spatial Aptitude	90
P-Form Perception	95

Research Summary

Sample:

52 (49 male and 4 female) workers employed as Strippers in Wisconsin.

This study was conducted prior to the requirement of providing minority group information. Therefore, minority group status is unknown.

Criterion:

Supervisory ratings.

Design:

Concurrent (test and criterion data were collected at approximately the same time).

Minimum aptitude requirements were determined on the basis of a job analysis and statistical analyses of aptitude mean scores, aptitude-criterion correlations and selective efficiencies.

Concurrent Validity:

Phi Coefficient = .56 ($P/2 < .0005$)

Effectiveness of Norms:

Only 66% of the nontest-selected workers used for this study were good workers; if the workers had been test-selected with the above norms, 82% would have been good workers. Thirty-four percent of the nontest-selected workers used for this study were poor workers; if the workers had been test-selected with the above norms, only 18% would have been poor workers. The effectiveness of the norms is shown graphically in Table 1:

TABLE 1

Effectiveness of Norms

	Without Tests	With Tests
Good Workers	66%	82%
Poor Workers	34%	18%

SAMPLE DESCRIPTION

Size:

N = 53

Occupational Status:

Employed Workers.

Work Setting:

Workers were employed by 12 lighographic companies affiliated with the Graphic Arts Association in Milwaukee, Wisconsin.

Company

Arandell Corporation
Dosie and Johnson Company
Inland Press
W. A. Krueger Company
Kruz Company
Lithographic Corporation
Lithoplate Company
Mandel Company
Milprint, Incorporated
Milwaukee Offset Service
Mueller Color Plate Company
E. F. Schmidt Company

Employer Selection Requirements:

Education: None required. High school education preferred.

Previous Experience: None required

Tests: None used

Other: Personal interview.

Principal Activities:

The job duties for each worker are comparable to those shown in the job description in the Appendix.

Minimum Experience:

All workers in the final sample had at least 21 months job experience in addition to having completed a four year apprenticeship.

TABLE 2

Means, Standard Deviations (SD), Ranges and Pearson Product-Moment Correlations with the Criterion (r) for Age, Education and Experience.

	Mean	SD	Range	r
Age (years)	34.9	7.2	22-52	.006
Education (years)	12.2	1.3	8-16	.056
Experience (months)	106.2	46.5	21-240	.297*

*Significant at the .05 level

EXPERIMENTAL TEST BATTERY

All 12 tests of the GATB, B-1002A, and the Dvorine Pseudvisochromatic color discriminiation test were administered during the period August 1957 to May 1958.

CRITERION

The criterion data consisted of supervisory ratings of job proficiency made at approximately the same time as the tests were administered with a time interval of two or three weeks between the two ratings. The immediate supervisor rated each worker.

Rating Scale:

Form SP-21 "Descriptive Rating Scale" was used. The scale (see Appendix) consists of nine items covering different aspects of job performance. Each item has five alternative responses corresponding to different degrees of job proficiency.

Reliability:

A reliability coefficient of .96 was obtained between the initial rating and the re-ratings, indicating a significant relationship.

Criterion Score Distribution:

Possible Range:	18-90
Actual Range:	27-82
Mean:	60.8
Standard Deviation:	12.4

Criterion Dichotomy:

The criterion distribution was dichotomized into low and high groups by placing 34% of the sample in the low group to correspond with the percentage of workers considered unsatisfactory or marginal. Workers in the high criterion group were designated as "good workers" and those in the low group as "poor workers." The criterion critical score is 55.

APTITUDES CONSIDERED FOR INCLUSION IN THE NORMS

Aptitudes were selected for tryout in the norms on the basis of a qualitative analysis of job duties involved and a statistical analysis of test and criterion data. Tables 3, 4, and 5 show the results of the qualitative and statistical analyses.

TABLE 3

Qualitative Analysis
(Based on the job analysis, the aptitudes indicated appear to be important to the work performance)

Aptitudes	Rationale
G - General Learning Ability	Required to interpret copy and written instructions and to determine methods and procedure to follow for each job.
N - Numerical Aptitude	Required to compute linear and angular measurements to an accuracy of .001".
P - Form Perception	Required to locate errors, blemishes and defects in films and to make corrections and modifications, to determine that the black ard white representation of the photographic image on film or plate correspond to size and shape in conformity with client's copy.
K - Motor Coordination	Required to accurately guide brushes and hand tools
F - Finger Dexterity	Required to precisely position cut film on sheet according to copy.
M - Manual Dexterity	Required to handle and move hand tools.

TABLE 4

Means, Standard Deviations (SD), Ranges and Pearson Product-Moment Correlations with the Criterion (r) for the Aptitudes of the GATB; N=53

Aptitudes	Mean	SD	Range	r
G - General Learning Ability	108.3	12.4	72-133	.403**
V - Verbal Aptitude	104.2	11.8	78-127	-.015
N - Numerical Aptitude	99.5	12.3	63-122	.550**
S - Spatial Aptitude	116.4	18.8	74-160	.326*
P - Form Perception	107.9	14.5	81-146	.400**
Q - Clerical Perception	104.7	12.0	78-130	.145
K - Motor Coordination	101.5	16.4	64-151	.016
F - Finger Dexterity	102.1	16.8	52-148	.149
M - Manual Dexterity	101.5	18.4	48-143	.005
Dvorine Pseudo Isochromatic (color discrimination)	13.1	2.5	1-14	.113

**Significant at the .01 level
*Significant at the .05 level

TABLE 5

Summary of Qualitative and Quantitative Data

Type of Evidence	Aptitudes								
	G	V	N	S	P	Q	K	F	M
Job Analysis Data									
Important	X		X	X	X		X	X	X
Irrelevant									
Relatively High Mean	X			X	X				
Relatively Low Standard Dev.	X	X	X			X			
Significant Correlation with Criterion	X		X	X	X				
Aptitudes to be Considered for Trial Norms	G		N	S	P				

DERIVATION AND VALIDITY OF NORMS

Final norms were derived on the basis of the degree to which trial norms consisting of various combinations of aptitudes G, N, S, and P at trial cutting scores were able to differentiate between the 66% of the sample considered to be good workers and the 34% of the sample considered to be poor workers. Trial cutting scores at five-point intervals approximately one standard deviation below the mean are tried because this will eliminate about one-third of the sample with three-aptitude norms. For four-aptitude trial norms, cutting scores of slightly less than one standard deviation below the mean will eliminate about one-third of the sample; for the two-aptitude trial norms, minimum cutting scores of slightly more than one standard deviation below the mean will eliminate about one-third of the sample. The Phi Coefficient was used as a basis for comparing trial norms. Norms of N-85, S-90, and P-95 provided optimum differentiation for the occupation of Stripper (print. & pub.) 971.381-018. The validity of these norms is shown in Table 6 and is indicated by a Phi Coefficient of .56 (statistically significant at the .0005 level).

TABLE 6

Concurrent Validity of Test Norms

N-85, S-90, and P-95

	Nonqualifying Test Scores	Qualifying Test Scores	Total
Good Workers	2	33	35
Poor Workers	11	7	18
Total	13	40	53

Phi Coefficient = .56 Chi Square (X^2_y) = 16.8

Significance Level = P/2 < .0005

DETERMINATION OF OCCUPATIONAL APTITUDE PATTERN

The data for this study met the requirements for incorporating the occupation studied into OAP-34 which is shown in the 1970 edition of Section II of the Manual for the General Aptitude Test Battery. A Phi Coefficient of .47 is obtained with the OAP-34 norms of N-90, S-95, and P-90.

SP-21

A-P-P-E-N-D-I-X

DESCRIPTIVE RATING SCALE
(For Aptitude Test Development Studies)

Score____

RATING SCALE FOR _____
D. O. T. Title and Code

Directions: Please read Form SP-20, "Suggestions to Raters", and then fill in the items listed below. In making your ratings, only <u>one</u> box should be checked for each question.

Name of Worker (print) _____
(Last) (First)

Sex: Male_____ Female_____

Company Job Title: _____

How often do you see this worker in a work situation?

☐ See him at work all the time.

☐ See him at work several times a day.

☐ See him at work several times a week.

☐ Seldom see him in work situation.

How long have you worked with him?

☐ Under one month.

☐ One to two months.

☐ Three to five months.

☐ Six months or more.

A. How much work can he get done? (Worker's ability to make efficient use of his time and to work at high speed.)

☐ 1. Capable of very low work output. Can perform only at an unsatisfactory pace.

☐ 2. Capable of low work output. Can perform at a slow pace.

☐ 3. Capable of fair work output. Can perform at an acceptable but not a fast pace.

☐ 4. Capable of high work output. Can perform at a fast pace.

☐ 5. Capable of very high work output. Can perform at an unusually fast pace.

B. How good is the quality of his work? (Worker's ability to do high-grade work which meets quality standards.)

☐ 1. Performance is inferior and almost never meets minimum quality standards.

☐ 2. The grade of his work could stand improvement. Performance is usually acceptable but somewhat inferior in quality.

☐ 3. Performance is acceptable but usually not superior in quality.

☐ 4. Performance is usually superior in quality.

☐ 5. Performance is almost always of the highest quality.

C. How accurate is he in his work? (Worker's ability to avoid making mistakes.)

☐ 1. Makes very many mistakes. Work needs constant checking.

☐ 2. Makes frequent mistakes. Work needs more checking than is desirable.

☐ 3. Makes mistakes occasionally. Work needs only normal checking.

☐ 4. Makes few mistakes. Work seldom needs checking.

☐ 5. Rarely makes a mistake. Work almost never needs checking.

D. How much does he know about his job? (Worker's understanding of the principles, equipment, materials and methods that have to do directly or indirectly with his work.)

☐ 1. Has very limited knowledge. Does not know enough to do his job adequately.

☐ 2. Has little knowledge. Knows enough to "get by."

☐ 3. Has moderate amount of knowledge. Knows enough to do fair work.

☐ 4. Has broad knowledge. Knows enough to do good work.

☐ 5. Has complete knowledge. Knows his job thoroughly.

E. How much aptitude or facility does he have for this kind of work? (Worker's adeptness or knack for performing his job easily and well.)

☐ 1. Has great difficulty doing his job. Not at all suited to this kind of work.

☐ 2. Usually has some difficulty doing his job. Not too well suited to this kind of work.

☐ 3. Does his job without too much difficulty. Fairly well suited to this kind of work.

☐ 4. Usually does his job without difficulty. Well suited to this kind of work.

☐ 5. Does his job with great ease. Exceptionally well suited for this kind of work.

F. How large a variety of job duties can he perform efficiently? (Worker's ability to handle several different operations in his work.)

☐ 1. Cannot perform different operations adequately.

☐ 2. Can perform a limited number of different operations efficiently.

☐ 3. Can perform several different operations with reasonable efficiency.

☐ 4. Can perform many different operations efficiently.

☐ 5. Can perform an unusually large variety of different operations efficiently.

G. How resourceful is he when something different comes up or something out of the ordinary occurs? (Worker's ability to apply what he already knows to a new situation.)

☐ 1. Almost never is able to figure out what to do. Needs help on even minor problems.

☐ 2. Often has difficulty handling new situations. Needs help on all but simple problems.

☐ 3. Sometimes knows what to do, sometimes doesn't. Can deal with problems that are not too complex.

☐ 4. Usually able to handle new situations. Needs help on only complex problems.

☐ 5. Practically always figures out what to do himself. Rarely needs help, even on complex problems.

H. How many practical suggestions does he make for doing things in better ways? (Worker's ability to improve work methods.)

☐ 1. Sticks strictly with the routine. Contributes nothing in the way of practical suggestions.

☐ 2. Slow to see new ways to improve methods. Contributes few practical suggestions.

☐ 3. Neither quick nor slow to see new ways to improve methods. Contributes some practical suggestions.

☐ 4. Quick to see new ways to improve methods. Contributes more than his share of practical suggestions.

☐ 5. Extremely alert to see new ways to improve methods. Contributes an unusually large number of practical suggestions.

I. Considering all the factors already rated, and <u>only</u> these factors, how acceptable is his work? (Worker's "all-around" ability to do his job.)

☐ 1. Would be better off without him. Performance usually not acceptable.

☐ 2. Of limited value to the organization. Performance somewhat inferior.

☐ 3. A fairly proficient worker. Performance generally acceptable.

☐ 4. A valuable worker. Performance usually superior.

☐ 5. An unusually competent worker. Performance almost always top notch.

FACT SHEET

Job Title

Stripper (print & pub.) 971.381-018

Job Summary

Makes forms in conformity with client's copy to produce complete and accurate forms to be used by lithographic platemaker. Examines positive and negative films for defects, modifies and registers films and forms for each job. Uses stripping tools to cut and assemble films in accordance with copy, working to an accuracy of .001 inch. Determines hues and values of colors in copy and corresponding black and white representation of the photographic image on film or plate.

Work Performed

Arranges positive and negative films on stripping table in conformity with client's copy and written instructions and mounts them on paper, glass, or acetate sheets to produce complete form to be used for contact exposure on lithographic press plate. Determines methods and sequence to be followed in laying out, mounting and modifying films by interpreting written instructions and examining films and artist's or client's copy.

Examines positive and negative films with magnifier for defects in image and tone values. Makes corrections on films by spotting out pinholes and outlining image with opaque and artist's brushes, removes blemishes by scraping with scrapers or by applying etching solution with cotton wad, and repairs half-tone areas by scribing or stippling with a needle or with pen and ink.

Prepares acetate, glass, or paper sheets for laying out, mashing, assembling, and mounting purposes by drawing or scribing required register and reference marks. Lays sheet of acetate, glass, or paper squarely on line-up table and fastens with clamps or scotch tape. Measures with ruler and moves "T" square or turns hand wheels to position straight edges as guides for scribing or drawing lines. Scribes accurate register or reference marks on film with a needle, or draws lines on paper or emulsion of glass plate with ruling pen and ink.

Cuts film to size and shape with scissors or razor blade and assembles them on prepared acetate, glass, or paper sheets, precisely positioning each film to conform to client's copy and written instructions. Fastens each film to mounting material with strips of scotch tape. Occasionally fastens films to glass or acetate with a film of vaseline. Sends assembly to contact man to print films and instructs him when to make blue-key films to be used for registering multicolor films.

Prepares color separation films for process (multicolor) printing by assembling films for each color on separate sheets of acetate or glass laid over a blue-key as a guide. Cuts each film to size and shape and places over corresponding area of key and fastens them with scotch tape.

Makes fake color-printing forms from client's black and white copy by blocking out all areas except those to be printed in prescribed color. Prepares one form for each color. Sends prepared flats to contact man with instructions for printing contact films to be used by lithographic plate maker.

blocks out areas to be left blank in printed films or plates by brushing on opaque with artist's and lettering brushes, cutting precisely fitting masks from transluscent or opaque paper and fastening in place with scotch tape, or by covering areas with opaque tape.

Selects half-tone contact screens and mounts them in place on film, glass, or paper mask at correct angle to give final copy desired color tint or effect of mass and shape. Softens hard edges of image, produces graduated shadings, and blocks out areas with artist's air brush.

Rules borders and does other precise line work with ruling and lettering pens and opaque or india ink. Draws straight and curved lines with straight edges, draftsman's triangles and french curves to guide pens and scribers and draws circles with a compass. Makes linear measurements with ruler and dividers and angular measurements with protractor and triangles.

Discusses problems of tone value and necessity for altering exposure or developing time with cameraman, contact man, and platemaker to produce quality image.

Effectiveness of Norms

Only 66% of the non-test-selected workers used for this study were good workers; if the workers had been test-selected with the S-140 R norms, 82.5% would have been good workers. 34% of the non-test-selected workers used for this study were poor workers; if the workers had been test-selected with the S-140R norms, only 17.5% would have been poor workers.

Applicability of S-140R Norms

The aptitude test battery is applicable to jobs which include a majority of duties described above.

GPO 898.790